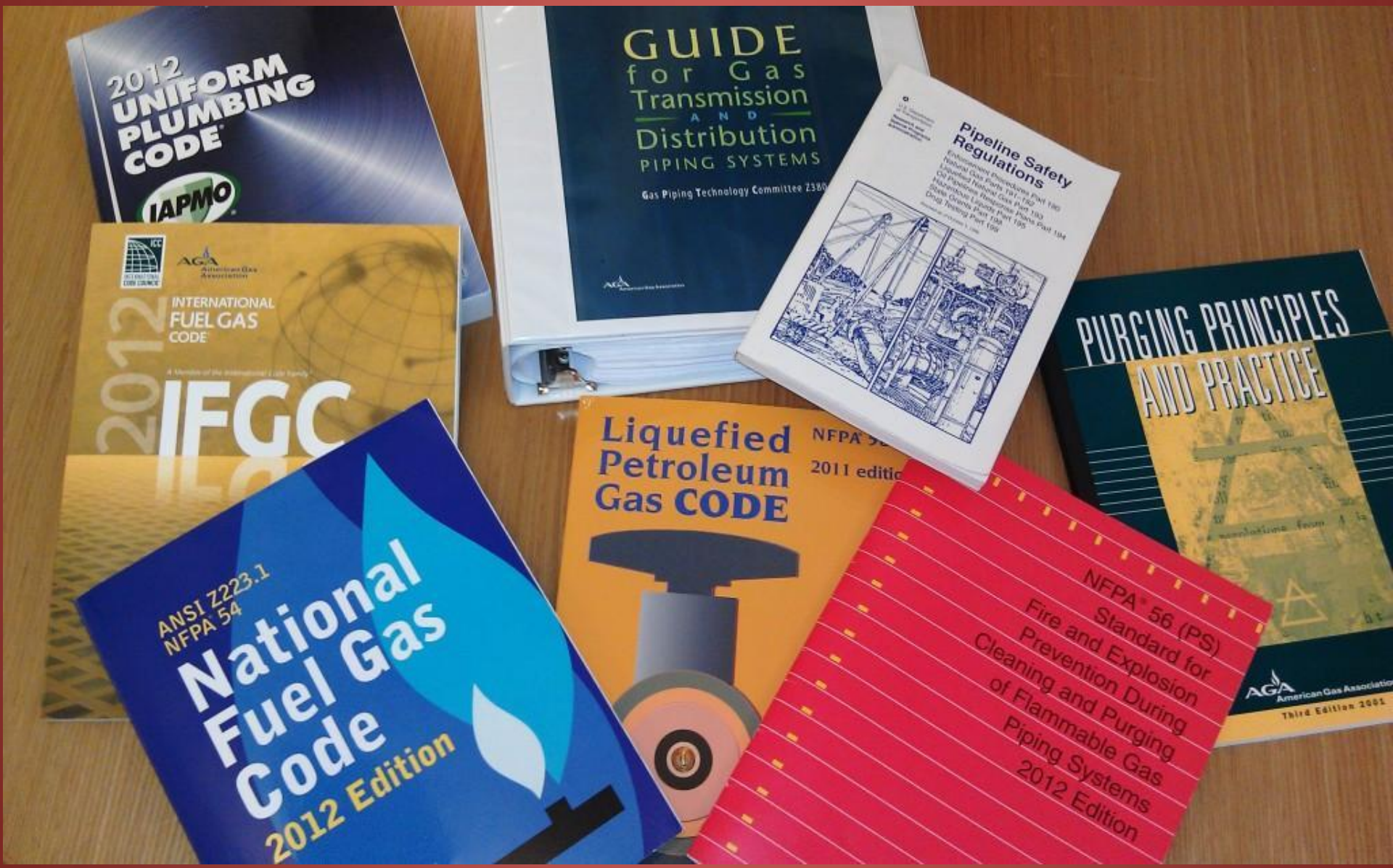
Fuel Gas Piping - Cleaning and Purging

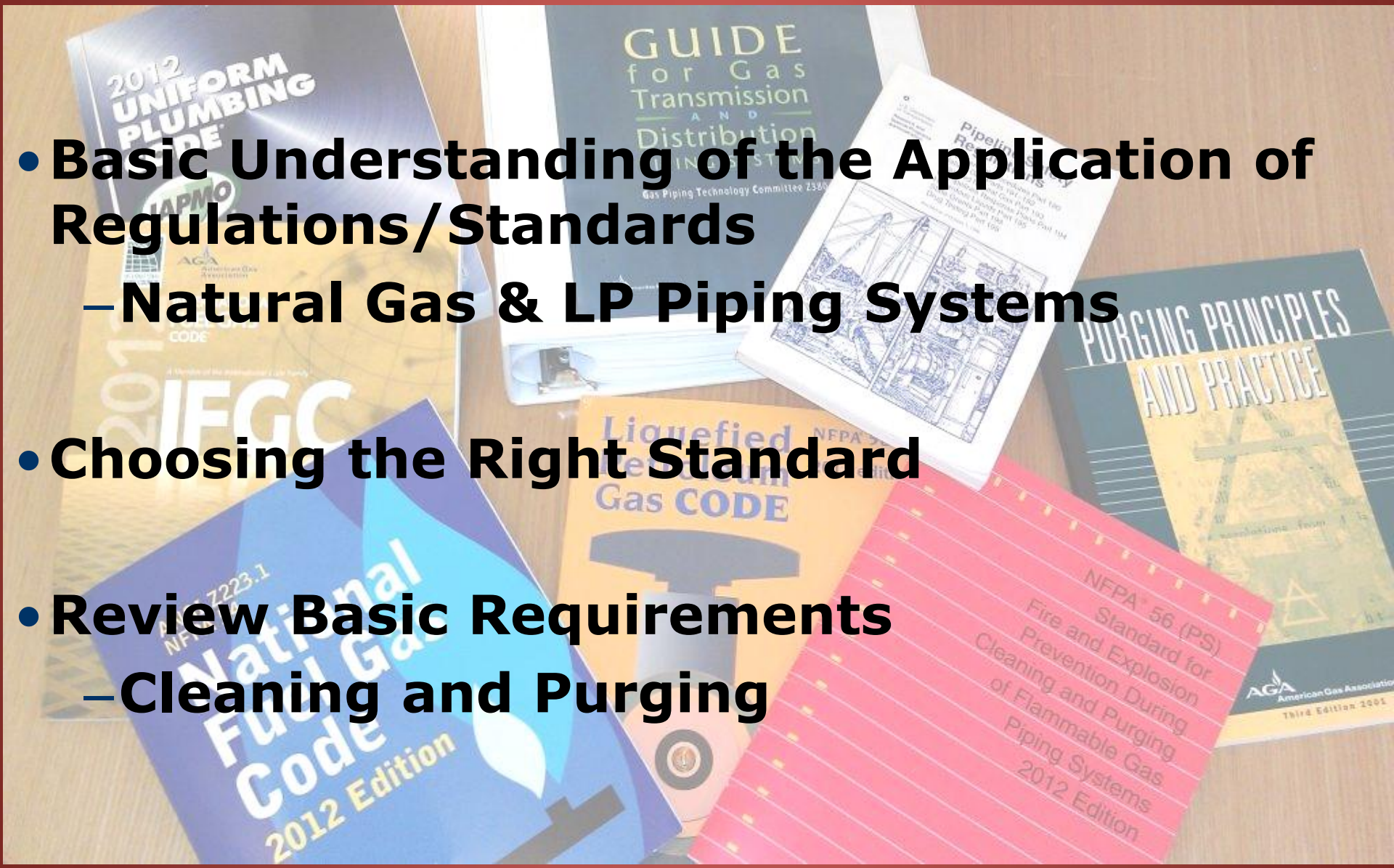
Industry Standards – GPTC Z380.1, Z223.1/NFPA 54, & NFPA 56

ASGE 2012 Annual Conference

So Many Standards So Little Time

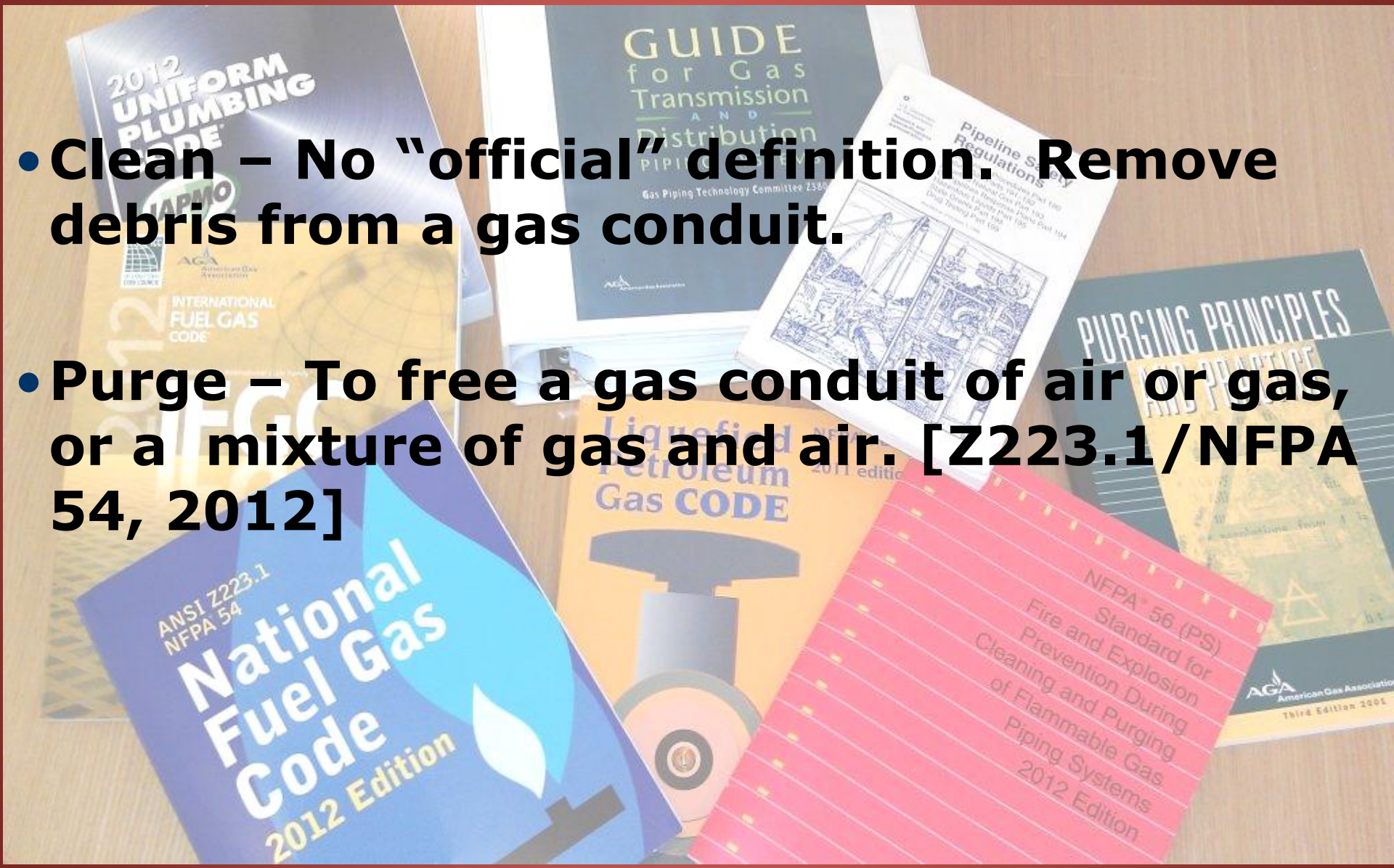


Topics



- **Basic Understanding of the Application of Regulations/Standards**
  - **Natural Gas & LP Piping Systems**
- **Choosing the Right Standard**
- **Review Basic Requirements**
  - **Cleaning and Purging**

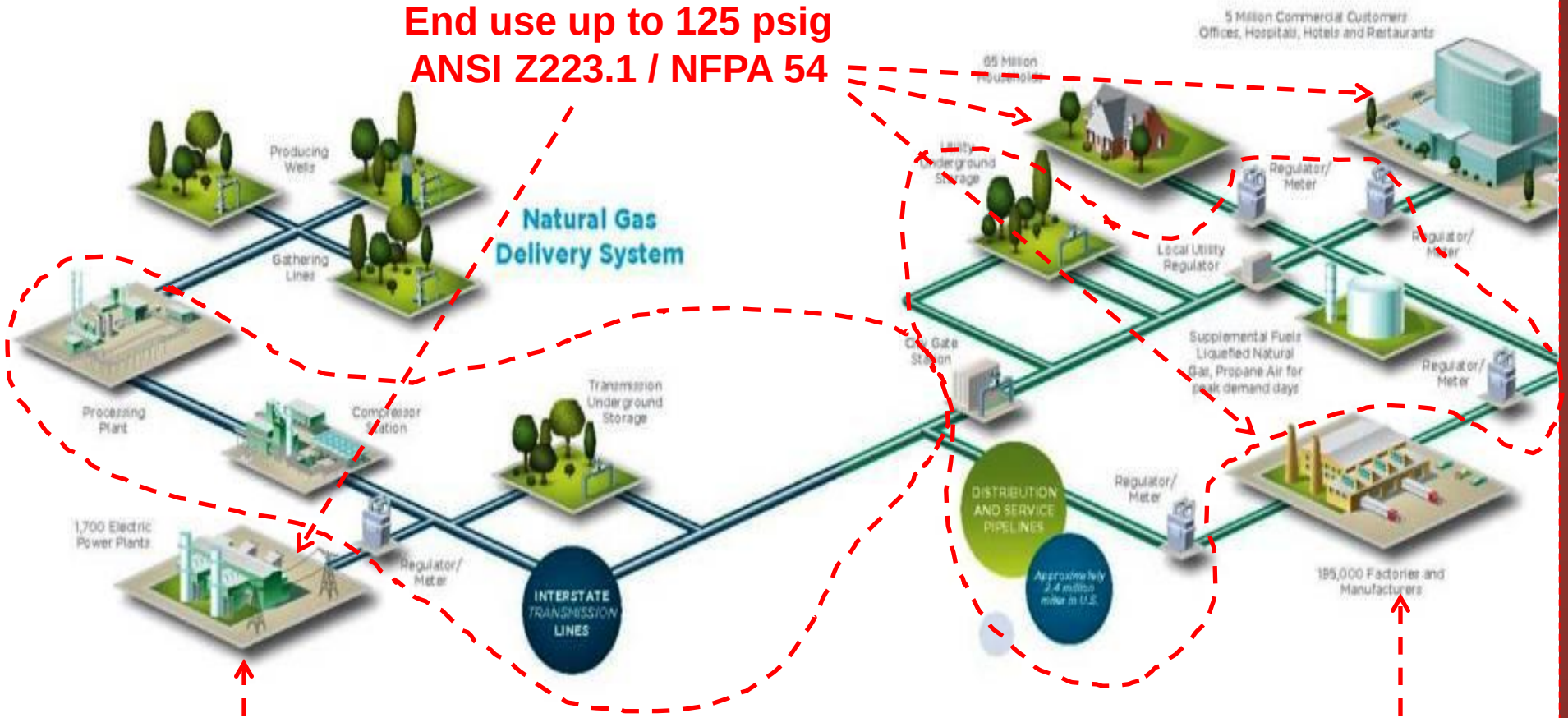
General Definitions



- **Clean – No "official" definition. Remove debris from a gas conduit.**
- **Purge – To free a gas conduit of air or gas, or a mixture of gas and air. [Z223.1/NFPA 54, 2012]**

WHICH STANDARD COVERS WHAT

End use up to 125 psig
ANSI Z223.1 / NFPA 54



Transportation System
Federal Regulations –
GPTC Z380.1

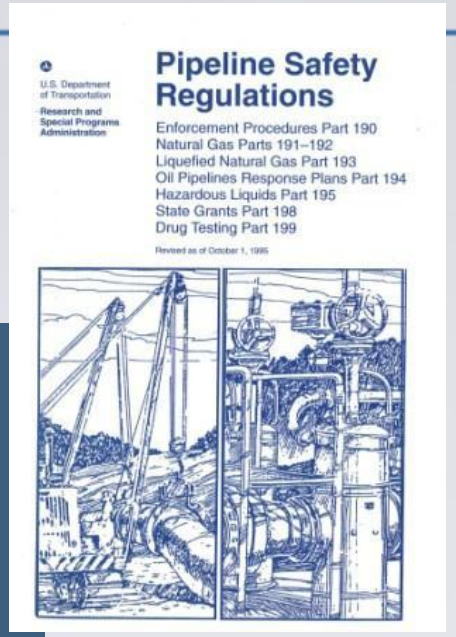
Distribution System
Federal Regulations –
GPTC Z380.1

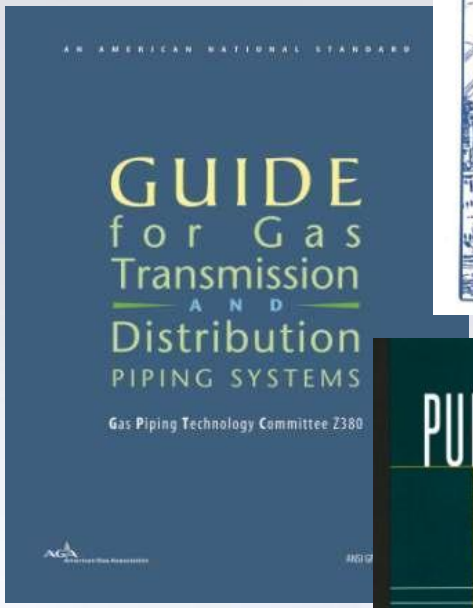
End use exceeding 125 psig
NFPA 56(PS)

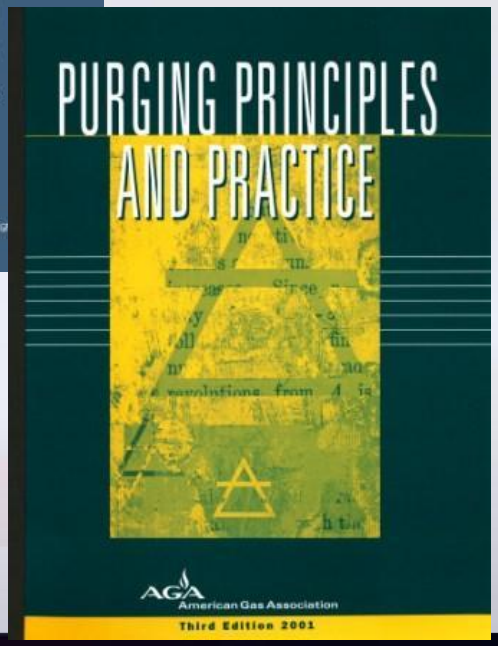
Transmission & Distribution Systems

Transmission & Distribution Systems

- DOT Regulations
  - CFR 49 Part 192
- ANSI GPTC Z380.1
  - Guidance on DOT Regulations
- Purging Principles and Practice
  - The Technical Basis





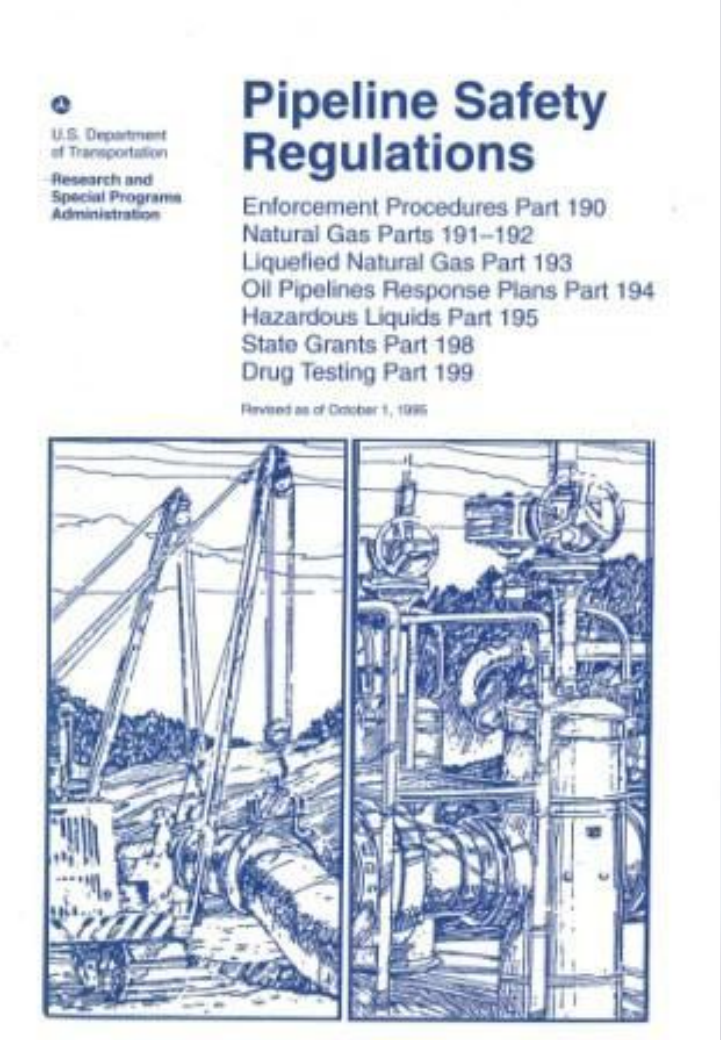


AGA American Gas Association

Credit information here.

Transmission & Distribution Systems

- Part 192 regulations
  - Provide (mostly) performance based regulations
  - Result from Natural Gas Pipeline Safety Act of 1968
  - Regulations effective November 1970
- All interstate and most intrastate operators must comply
- Requires operators to develop and maintain written procedures



Transmission & Distribution Systems – Cleaning

Appendix B to Part 192
Qualification of Pipe.

A. *Inspection.* The pipe must be clean enough to permit adequate inspection. It must be visually inspected to ensure that it is reasonably round and straight and that there are no defects which might impair the strength or tightness of the pipe.

Requirement

- Delivered pipe must be clean
- No general cleaning requirement post construction in the requirements
- Regulations focus on internal corrosion (steel)

Transmission & Distribution Systems - Purging

§192.629
Purging of pipelines

(a) When a pipeline is being purged of air by use of gas, the gas must be released into one end of the line in a moderately rapid and continuous flow. If gas cannot be supplied in sufficient quantity to prevent the formation of a hazardous mixture of gas and air, a slug of inert gas must be released into the line before the gas.

(b) When a pipeline is being purged of gas by use of air, the air must be released into one end of the line in a moderately rapid and continuous flow. If air cannot be supplied in sufficient quantity to prevent the formation of a hazardous mixture of gas and air, a slug of inert gas must be released into the line before the air.

Requirement

- Purging (in or out of service) – prevent a hazardous mixture of gas and air.

Transmission & Distribution Systems - Purging

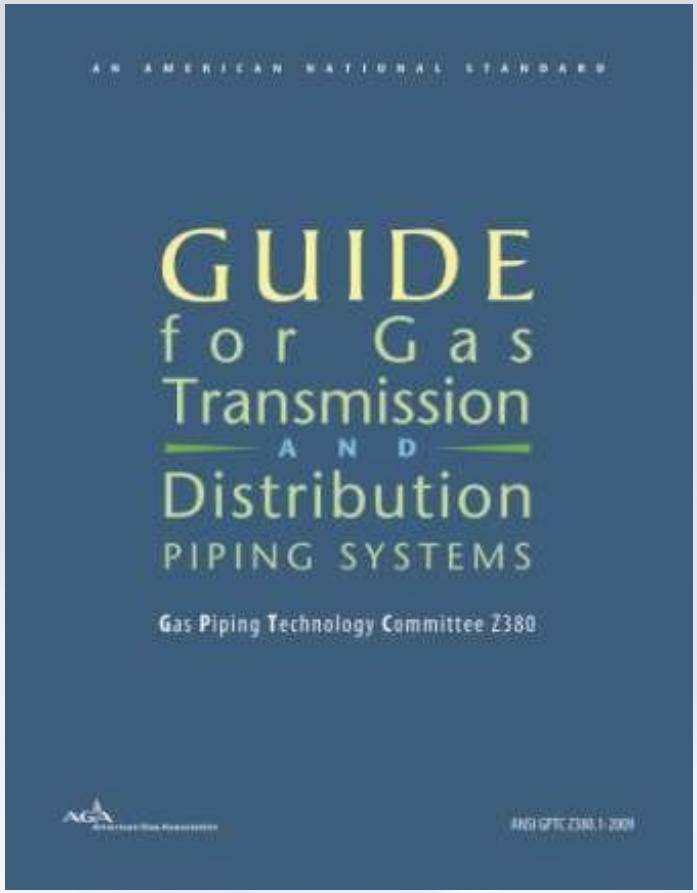
§192.751
Prevention of accidental ignition.
Each operator shall take steps to minimize the danger of accidental ignition of gas in any structure or area where the presence of gas constitutes a hazard of fire or explosion, including the following:
(a) When a hazardous amount of gas is being vented into open air, each potential source of ignition must be removed from the area and a fire extinguisher must be provided.
(b) Gas or electric welding or cutting may not be performed on pipe or on pipe components that contain a combustible mixture of gas and air in the area of work.
(c) Post warning signs, where appropriate..

Requirement

- Minimize ignition sources
- Warn

Transmission & Distribution Systems

- ANSI Standard that provides guidance
  - Federal 191 & 192 regulations
  - Published December 1970
  - Committee consists of gas operators, regulators, manufacturers and general interest
- Assist operators to meet federal regulations
  - Contains gas operator practices
  - Discussion of issues and considerations
  - Appendices covering common techniques and practices



Transmission & Distribution Systems

GUIDE MATERIAL

§192.629 - Purging of pipelines

1 REFERENCE

AGA XK0101, "Purging Principles and Practice."

2 NOTIFICATIONS

For notification of public officials and the public in the vicinity of purge or discharge, see 4 of the guide material under §192.751.

GUIDANCE

- Reference to Purging Principles and Practice
- Contains guidance on notification

Transmission & Distribution Systems

GUIDE MATERIAL
§192.751 - Prevention of accidental ignition.

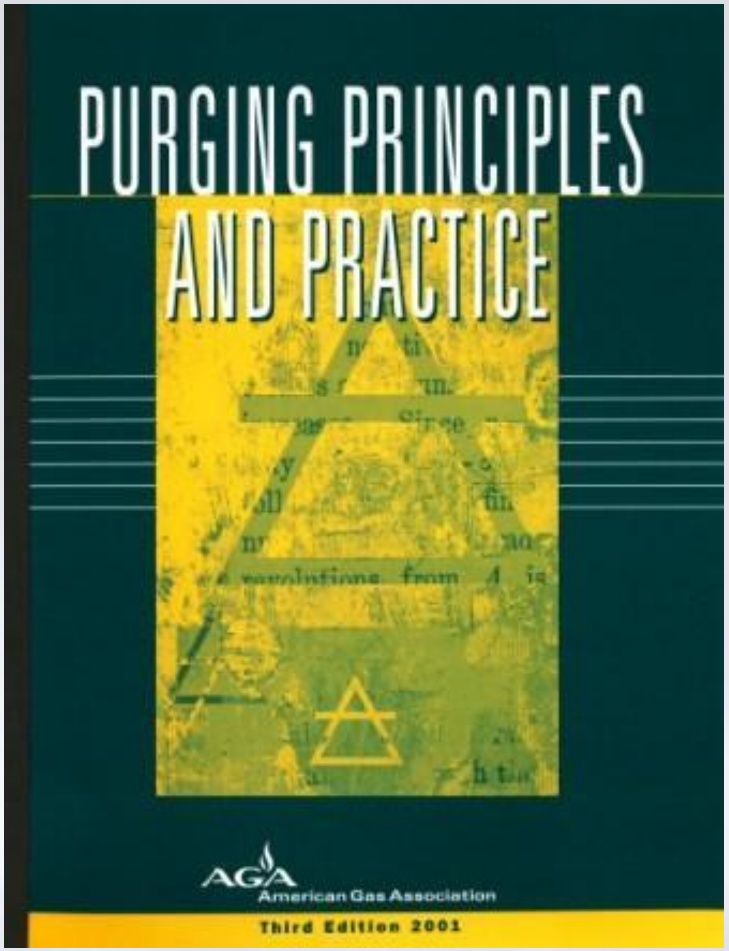
- **GUIDE MATERIAL**
- **1 GENERAL**
- *1.1 Smoking and open flames….*
- *1.2 Accidental electric arcing….*
- *1.3 Static electricity on plastic pipe…*
- *1.4 Other sources of ignition…*
- *1.5 Fire extinguishers…*
- *1.6 Verification of the presence of gas…*
- **2 WELDING, CUTTING AND OTHER HOT WORK**
- *2.1 General…*
- *2.2 Pipelines filled with gas…*
- *2.3 Pipelines containing air…*
- **3 ISOLATING PIPELINE SEGMENTS ON PLANNED WORK TO MINIMIZE THE POTENTIAL OF**
- **IGNITION**
- *3.1 General…*
- *3.2 Isolating pipeline segments…*
- **4 NOTIFICATIONS PRIOR TO PURGE OR BLOWDOWN**
- *4.1 Public officials…*
- *4.2 Public in vicinity of gas discharge…*
- **5 REFERENCE**

GUIDANCE

- Detailed description of possible ignition sources
- Public warning

Transmission & Distribution Systems

- Not a standard
- Used by gas operators to assist in the development of their own purging practices

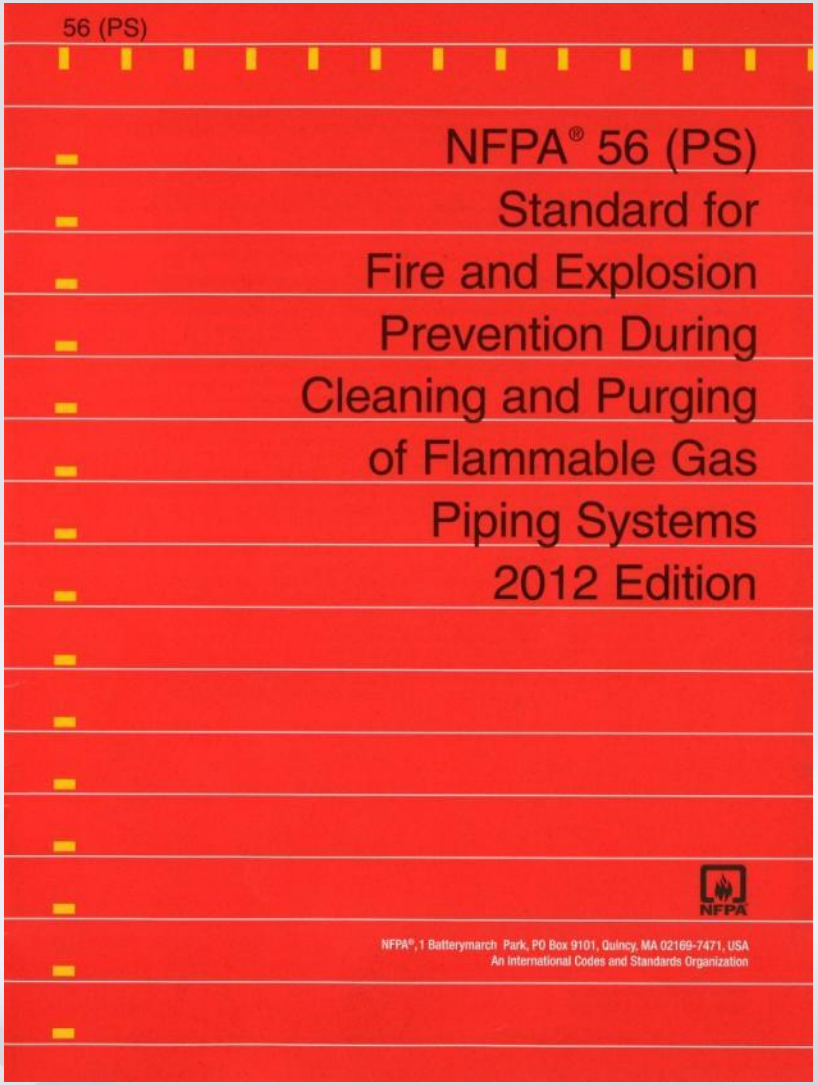


Natural Gas Systems Above 125 psig

Photo courtesy Pacific Corporation

Natural Gas Systems Above 125 psig

- NFPA 56(PS) is a Provisional Standard
  - Developed under NFPA's emergency procedures
- Response to Kleen Energy power plant accident
  - Based on Chemical Safety Board's recommendations
- Life span of 2 years
  - Replacement standard under development



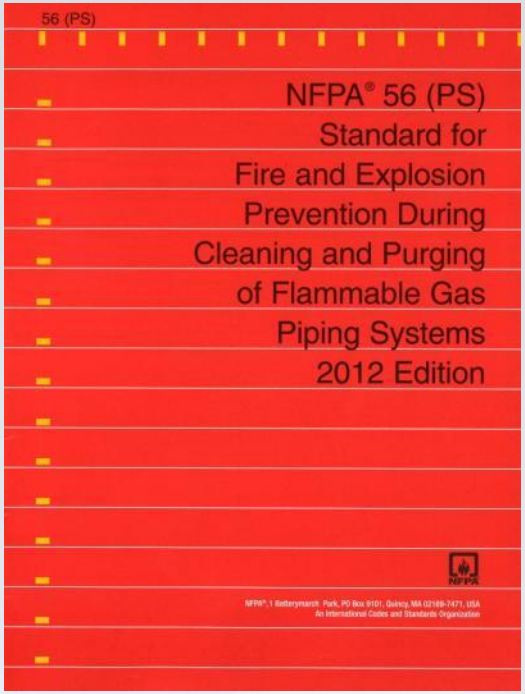
Natural Gas Systems Above 125 psig

- NFPA 56(PS) Background
- Developed in response to the Kleen Energy Accident
  - 6 Fatalities, at least 50 workers injured

Photo Courtesy of the US Chemical Safety Board

NFPA 56 PS

CONTENTS



Section 1 Administration
Section 2 Referenced Publications
Section 3 Definitions
Section 4 General Requirements
Section 5 Training Requirements
Section 6 Cleaning
Section 7 Purging into Service
Section 8 Purging Out of Service
Annex A Explanatory Material
Annex B Purge End Points for Common Flammable Gases
Annex C Sample Purge Procedure
Annex D Informational References

NFPA 56 PS

SCOPE

- This standard shall apply to fire and explosion prevention during cleaning and purging activities for new and existing flammable gas piping found in electric generating plants and in industrial, institutional, and commercial applications.

- Coverage of piping systems shall extend from the point of delivery to the gas-consuming equipment isolation valve.

NFPA 56 PS

SCOPE

This standard shall not apply to the following items:

- Piping systems covered by NFPA 2
- Piping systems covered by NFPA 54
- Piping systems covered by NFPA 58
- LP-Gas (including refrigerated storage) at utility as plants *(see NFPA 59)*
- LNG facilities covered by NFPA 59A
- LP-Gas used with oxygen for cutting, welding, or other hot work
- Vehicle fuel dispensers
- Commissioning and maintenance of appliances or equipment
- Vent lines from pressure relief valves
- Systems regulated by U.S. Department of Transportation (DOT) 49 CFR 191 and 192

NFPA 56 PS

CLEANING AND PURGING PROCEDURES

- Written cleaning and purging procedures shall be developed and implemented
- Written procedure for each cleaning and purging activity shall address, as a minimum, the following items:
  - Scope of work and site-specific purge procedure development
  - Environmental conditions and work locations
  - Communication plans
  - Control of ignition sources
  - Pre-purge piping system assessment
  - Purge monitoring and instrumentation

NFPA 56 PS

TRAINING REQUIREMENTS

- Persons shall be provided with training
- Training shall include hazards of flammable and compressed gases, safe handling practices, emergency response procedures & equipment, and company policy
- Training shall be conducted by a competent person and shall be documented
- Training records shall be maintained for a period not less than 5 years

NFPA 56 PS

CLEANING OF FLAMMABLE GAS PIPING

- Flammable gas shall not be used for internal cleaning of piping.

- Air, inert gas, steam, and water shall be acceptable cleaning media.

NFPA 56 PS

CLEANING OF FLAMMABLE GAS PIPING

- Pigs are permitted to be used to clean piping systems.

- Pig cleaning using flammable gas as the propellant shall utilize a closed piping system.

NFPA 56 PS

PURGING INTO SERVICE

- Where gas piping containing air is placed in operation, the air in the piping first shall be displaced with an inert gas, which then shall be displaced with flammable gas.

- Plants owned or operated by the serving natural gas supplier – in accordance with the serving supplier's written procedures.

NFPA 56 PS

PURGING INTO SERVICE
Discharge of Purged Gases

- The vent discharge from a piping system being purged into service shall discharge directly to a safe outdoor location as determined by the written purge procedure

- The discharge gases from the permanent piping system shall be monitored on a continual basis with appropriate detection equipment

NFPA 56 PS

PURGING INTO SERVICE

Discharge of Purged Gas

- Purging operations introducing inert gas shall be continuous until the oxygen concentration detected at the discharge end is less than 60 percent of the limiting oxidant

- Purging operations that introduce flammable gas shall be continuous until at least 90 percent flammable gas by volume or the minimum concentration established by the purging procedure

NFPA 56 PS

PURGING OUT OF SERVICE

- Flammable gas piping shall be isolated from gas supply and downstream piping and equipment

- Where existing gas piping is purged out of service, the residual flammable gas in the piping shall be displaced with an inert gas.

- Plants owned or operated by the serving natural gas supplier - in accordance with the supplier's written procedures.

NFPA 56 PS

SUMMARY

- Prohibits use of flammable gas for internal cleaning of piping systems
- Allows the use of cleaning pigs propelled by flammable gas in closed systems
- Covers activities including cleaning new or repaired piping systems, placing piping systems into service, and removing piping systems from service
- Requires development of written procedures and a safety validation of procedures by competent persons

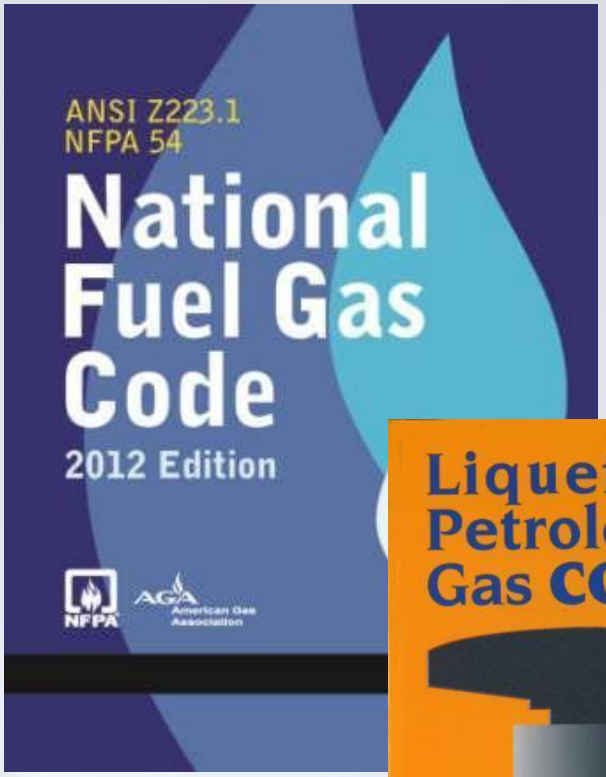
Natural Gas Systems Up To125 psi

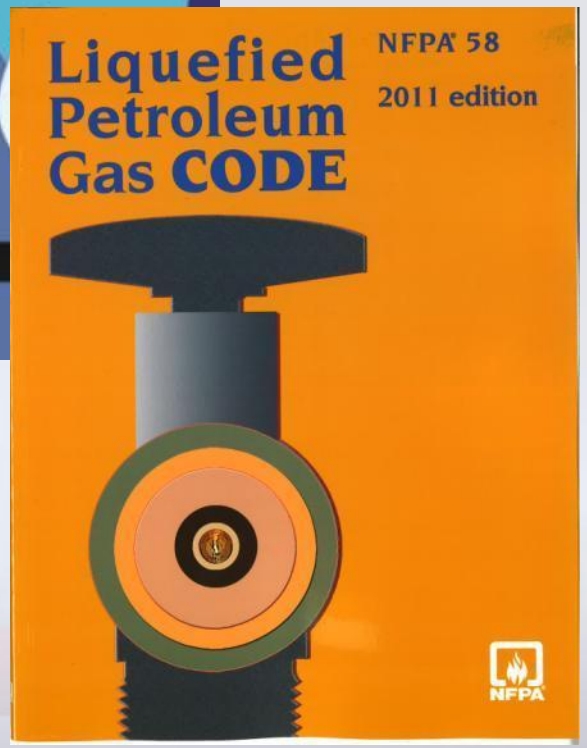
Photo courtesy Palm Beach Plumb

Natural Gas Systems Up To125 psi

National Fuel Gas Code is the governing standard

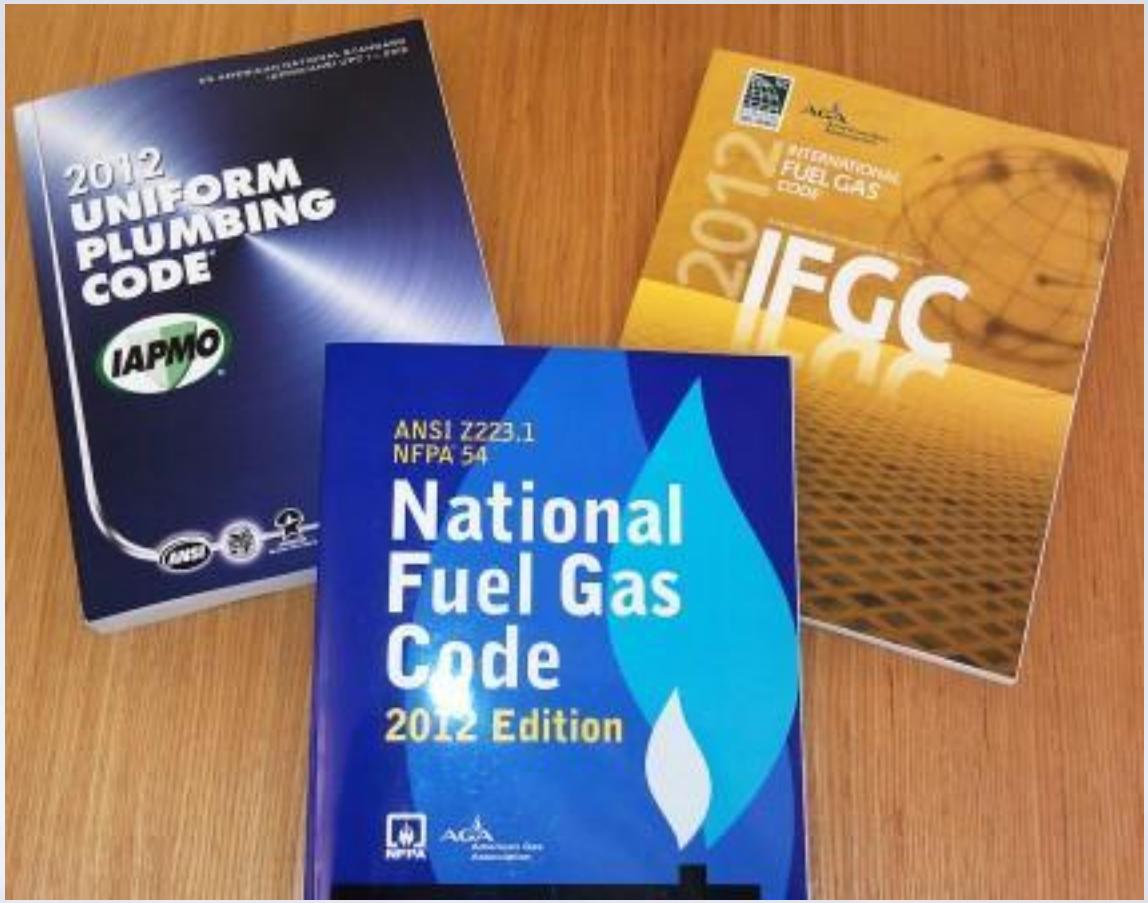
- Natural gas pressures up to 125 psig
- Gas-air flammable mixtures up to 10 psig
- LP pressures up to 20 psig
- NFPA 58 for LP pressures above 20 psig





Natural Gas Systems Up To125 psi

Same purging requirements is all model fuel gas installation codes



NFGC Cleaning

Pipe shall be cleared

"tell-tale" located between these valves. A valve shall not be subjected to the test pressure unless it can be determined that the valve, including the valve closing mechanism, is designed to safely withstand the test pressure.

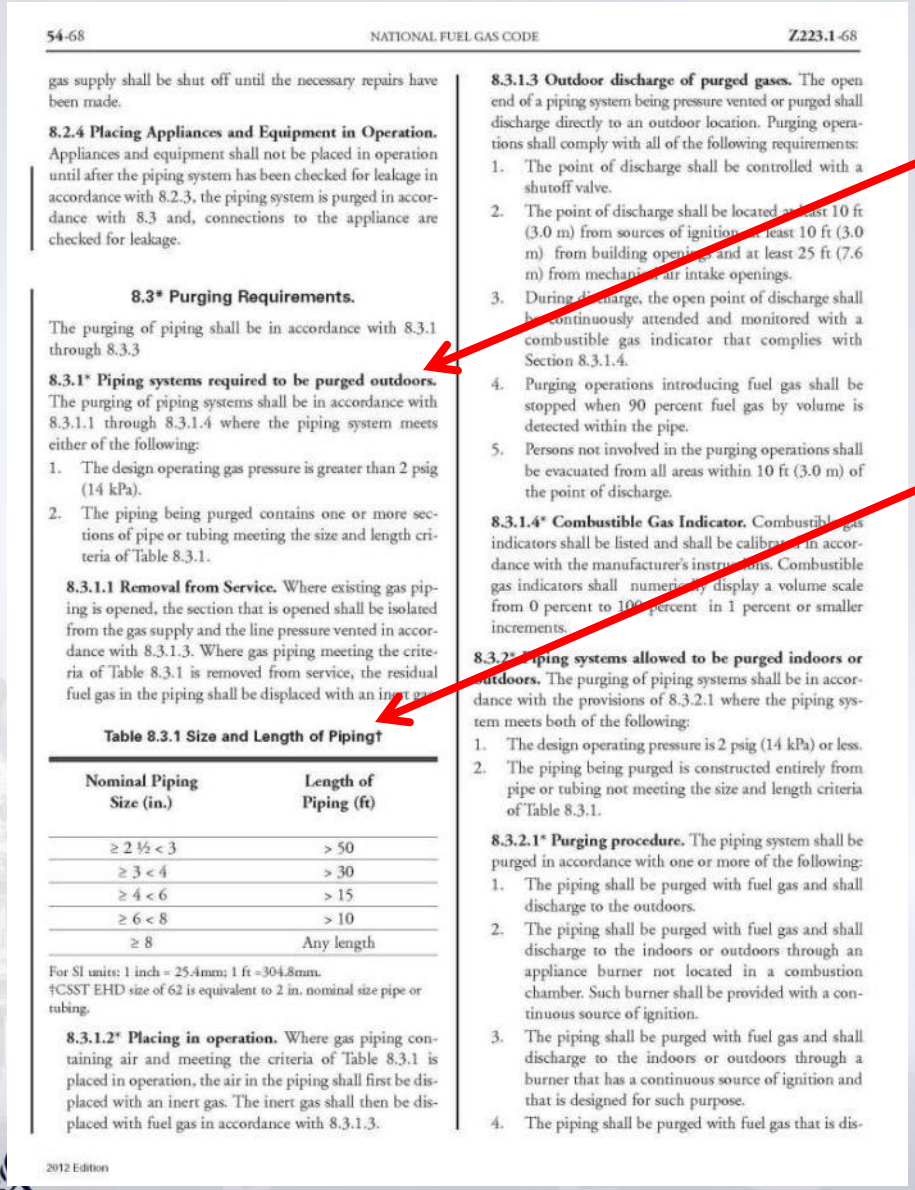
8.1.1.6 Regulator and valve assemblies fabricated independently of the piping system in which they are to be installed shall be permitted to be tested with inert gas or air at the time of fabrication.

8.1.1.7 Prior to testing, the interior of the pipe shall be cleared of all foreign material.

made. Mechanical gauges used to measure test pressures shall have a range such that the highest end of the scale is not greater than 5 times the test pressure.

8.1.4.2 The test pressure to be used shall be no less than 1½ times the proposed maximum working pressure, but not less than 3 psi (20 kPa), irrespective of design pressure. Where the test pressure exceeds 125 psi (862 kPa), the test pressure shall not exceed a value that produces a hoop stress in the piping greater than 50 percent of the specified minimum yield strength of the pipe.

NFGC Purging



54-68 NATIONAL FUEL GAS CODE Z223.1-68

gas supply shall be shut off until the necessary repairs have been made.

8.2.4 Placing Appliances and Equipment in Operation. Appliances and equipment shall not be placed in operation until after the piping system has been checked for leakage in accordance with 8.2.3, the piping system is purged in accordance with 8.3 and, connections to the appliance are checked for leakage.

8.3* Purging Requirements.

The purging of piping shall be in accordance with 8.3.1 through 8.3.3

8.3.1* Piping systems required to be purged outdoors. The purging of piping systems shall be in accordance with 8.3.1.1 through 8.3.1.4 where the piping system meets either of the following:

1. The design operating gas pressure is greater than 2 psig (14 kPa).
2. The piping being purged contains one or more sections of pipe or tubing meeting the size and length criteria of Table 8.3.1.

8.3.1.1 Removal from Service. Where existing gas piping is opened, the section that is opened shall be isolated from the gas supply and the line pressure vented in accordance with 8.3.1.3. Where gas piping meeting the criteria of Table 8.3.1 is removed from service, the residual fuel gas in the piping shall be displaced with an inert gas

Table 8.3.1 Size and Length of Piping†

Nominal Piping Size (in.)	Length of Piping (ft)
≥ 2 ½ < 3	> 50
≥ 3 < 4	> 30
≥ 4 < 6	> 15
≥ 6 < 8	> 10
≥ 8	Any length

For SI units: 1 inch = 25.4mm; 1 ft =304.8mm.
†CSST EHD size of 62 is equivalent to 2 in. nominal size pipe or tubing.

8.3.1.2* Placing in operation. Where gas piping containing air and meeting the criteria of Table 8.3.1 is placed in operation, the air in the piping shall first be displaced with an inert gas. The inert gas shall then be displaced with fuel gas in accordance with 8.3.1.3.

8.3.1.3 Outdoor discharge of purged gases. The open end of a piping system being pressure vented or purged shall discharge directly to an outdoor location. Purging operations shall comply with all of the following requirements:

1. The point of discharge shall be controlled with a shutoff valve.
2. The point of discharge shall be located at least 10 ft (3.0 m) from sources of ignition at least 10 ft (3.0 m) from building openings and at least 25 ft (7.6 m) from mechanical air intake openings.
3. During discharge, the open point of discharge shall be continuously attended and monitored with a combustible gas indicator that complies with Section 8.3.1.4.
4. Purging operations introducing fuel gas shall be stopped when 90 percent fuel gas by volume is detected within the pipe.
5. Persons not involved in the purging operations shall be evacuated from all areas within 10 ft (3.0 m) of the point of discharge.

8.3.1.4* Combustible Gas Indicator. Combustible gas indicators shall be listed and shall be calibrated in accordance with the manufacturer's instructions. Combustible gas indicators shall numerically display a volume scale from 0 percent to 100 percent in 1 percent or smaller increments.

8.3.2* Piping systems allowed to be purged indoors or outdoors. The purging of piping systems shall be in accordance with the provisions of 8.3.2.1 where the piping system meets both of the following:

1. The design operating pressure is 2 psig (14 kPa) or less.
2. The piping being purged is constructed entirely from pipe or tubing not meeting the size and length criteria of Table 8.3.1.

8.3.2.1* Purging procedure. The piping system shall be purged in accordance with one or more of the following:

1. The piping shall be purged with fuel gas and shall discharge to the outdoors.
2. The piping shall be purged with fuel gas and shall discharge to the indoors or outdoors through an appliance burner not located in a combustion chamber. Such burner shall be provided with a continuous source of ignition.
3. The piping shall be purged with fuel gas and shall discharge to the indoors or outdoors through a burner that has a continuous source of ignition and that is designed for such purpose.
4. The piping shall be purged with fuel gas that is dis-

2012 Edition

Splits requirements depending on piping size and operating pressure

Larger Systems are greater than 2 psig & greater than certain diameters & lengths

Purging

gas supply shall be shut off until the necessary repairs have been made.

8.2.4 Placing Appliances and Equipment in Operation. Appliances and equipment shall not be placed in operation until after the piping system has been checked for leakage in accordance with 8.2.3, the piping system is purged in accordance with 8.3 and, connections to the appliance are checked for leakage.

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The purging of piping shall be in accordance with 8.3.1 through 8.3.3

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1. The design operating gas pressure is greater than 2 psig (14 kPa).
2. The piping being purged contains one or more sections of pipe or tubing meeting the size and length criteria of Table 8.3.1.

8.3.1.1 Removal from Service. Where existing gas piping is opened, the section that is opened shall be isolated from the gas supply and the line pressure vented in accordance with 8.3.1.3. Where gas piping meeting the criteria of Table 8.3.1 is removed from service, the residual fuel gas in the piping shall be displaced with an inert gas.

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2. The point of discharge shall be located at least 10 ft (3.0 m) from sources of ignition, at least 10 ft (3.0 m) from building openings and at least 25 ft (7.6 m) from mechanical air intake openings.
3. During discharge, the open point of discharge shall be continuously attended and monitored with a combustible gas indicator that complies with Section 8.3.1.4.
4. Purging operations introducing fuel gas shall be stopped when 90 percent fuel gas by volume is detected within the pipe.
5. Persons not involved in the purging operations shall be evacuated from all areas within 10 ft (3.0 m) of the point of discharge.

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2. The piping shall be purged with fuel gas and shall discharge to the indoors or outdoors through an appliance burner not located in a combustion chamber. Such burner shall be provided with a continuous source of ignition.
3. The piping shall be purged with fuel gas and shall discharge to the indoors or outdoors through a burner that has a continuous source of ignition and that is designed for such purpose.
4. The piping shall be purged with fuel gas that is dis-

Purging into or out of service with inert gas required for larger systems

Purging

gas supply shall be shut off until the necessary repairs have been made.

8.2.4 Placing Appliances and Equipment in Operation. Appliances and equipment shall not be placed in operation until after the piping system has been checked for leakage in accordance with 8.2.3, the piping system is purged in accordance with 8.3 and, connections to the appliance are checked for leakage.

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3. During discharge, the open point of discharge shall be continuously attended and monitored with a combustible gas indicator that complies with Section 8.3.1.4.
4. Purging operations introducing fuel gas shall be stopped when 90 percent fuel gas by volume is detected within the pipe.
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2. The piping being purged is constructed entirely from pipe or tubing not meeting the size and length criteria of Table 8.3.1.

8.3.2.1* Purging procedure. The piping system shall be purged in accordance with one or more of the following:

1. The piping shall be purged with fuel gas and shall discharge to the outdoors.
2. The piping shall be purged with fuel gas and shall discharge to the indoors or outdoors through an appliance burner not located in a combustion chamber. Such burner shall be provided with a continuous source of ignition.
3. The piping shall be purged with fuel gas and shall discharge to the indoors or outdoors through a burner that has a continuous source of ignition and that is designed for such purpose.
4. The piping shall be purged with fuel gas that is dis-

Purging Requirements

- Outdoors only
- Continuously attend discharge point
- 10 ft from ignition sources
- 10 ft from openings & 25 ft from mechanical air intakes
- Evacuate non-purging personnel
- Purging stopped at 90% fuel gas by volume

Purging

gas supply shall be shut off until the necessary repairs have been made.

8.2.4 Placing Appliances and Equipment in Operation. Appliances and equipment shall not be placed in operation until after the piping system has been checked for leakage in accordance with 8.2.3, the piping system is purged in accordance with 8.3 and, connections to the appliance are checked for leakage.

8.3* Purging Requirements.

The purging of piping shall be in accordance with 8.3.1 through 8.3.3

8.3.1* Piping systems required to be purged outdoors. The purging of piping systems shall be in accordance with 8.3.1.1 through 8.3.1.4 where the piping system meets either of the following:

1. The design operating gas pressure is greater than 2 psig (14 kPa).
2. The piping being purged contains one or more sections of pipe or tubing meeting the size and length criteria of Table 8.3.1.

8.3.1.1 Removal from Service. Where existing gas piping is opened, the section that is opened shall be isolated from the gas supply and the line pressure vented in accordance with 8.3.1.3. Where gas piping meeting the criteria of Table 8.3.1 is removed from service, the residual fuel gas in the piping shall be displaced with an inert gas.

Table 8.3.1 Size and Length of Piping†

Nominal Piping Size (in.)	Length of Piping (ft)
≥ 2 ½ < 3	> 50
≥ 3 < 4	> 30
≥ 4 < 6	> 15
≥ 6 < 8	> 10
≥ 8	Any length

For SI units: 1 inch = 25.4mm; 1 ft =304.8mm.
†CSST EHD size of 62 is equivalent to 2 in. nominal size pipe or tubing.

8.3.1.2* Placing in operation. Where gas piping containing air and meeting the criteria of Table 8.3.1 is placed in operation, the air in the piping shall first be displaced with an inert gas. The inert gas shall then be displaced with fuel gas in accordance with 8.3.1.3.

8.3.1.3 Outdoor discharge of purged gases. The open end of a piping system being pressure vented or purged shall discharge directly to an outdoor location. Purging operations shall comply with all of the following requirements:

1. The point of discharge shall be controlled with a shutoff valve.
2. The point of discharge shall be located at least 10 ft (3.0 m) from sources of ignition, at least 10 ft (3.0 m) from building openings and at least 25 ft (7.6 m) from mechanical air intake openings.
3. During discharge, the open point of discharge shall be continuously attended and monitored with a combustible gas indicator that complies with Section 8.3.1.4.
4. Purging operations introducing fuel gas shall be stopped when 90 percent fuel gas by volume is detected within the pipe.
5. Persons not involved in the purging operations shall be evacuated from all areas within 10 ft (3.0 m) of the point of discharge.

8.3.1.4* Combustible Gas Indicator. Combustible gas indicators shall be listed and shall be calibrated in accordance with the manufacturer's instructions. Combustible gas indicators shall numerically display a volume scale from 0 percent to 100 percent in 1 percent or smaller increments.

8.3.2* Piping systems allowed to be purged indoors or outdoors. The purging of piping systems shall be in accordance with the provisions of 8.3.2.1 where the piping system meets both of the following:

1. The design operating pressure is 2 psig (14 kPa) or less.
2. The piping being purged is constructed entirely from pipe or tubing not meeting the size and length criteria of Table 8.3.1.

8.3.2.1* Purging procedure. The piping system shall be purged in accordance with one or more of the following:

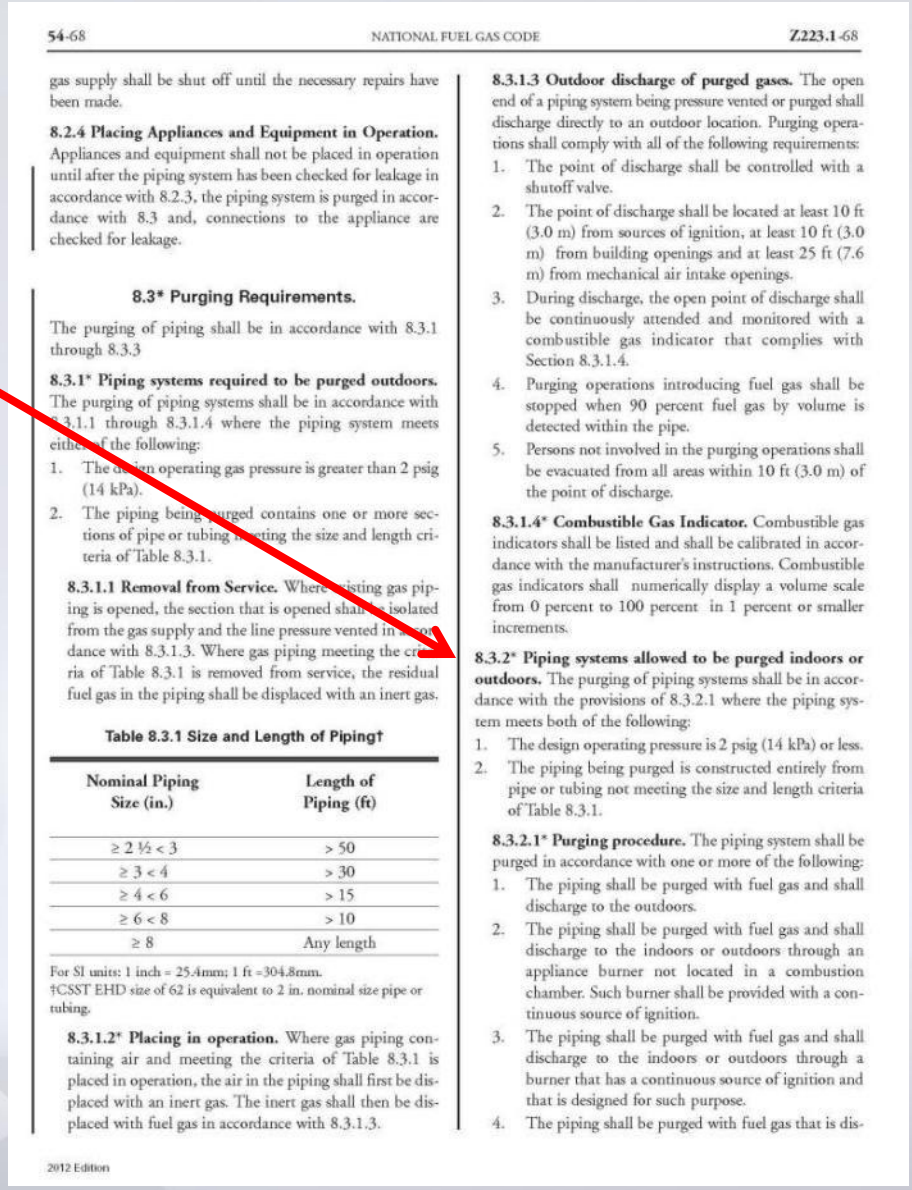
1. The piping shall be purged with fuel gas and shall discharge to the outdoors.
2. The piping shall be purged with fuel gas and shall discharge to the indoors or outdoors through an appliance burner not located in a combustion chamber. Such burner shall be provided with a continuous source of ignition.
3. The piping shall be purged with fuel gas and shall discharge to the indoors or outdoors through a burner that has a continuous source of ignition and that is designed for such purpose.
4. The piping shall be purged with fuel gas that is dis-

Combustible Gas Indicator

- Calibrated
- Volume Scale 0%-100% /1% Increments
- Listed CGI

Purging

Smaller systems –2 psi or less & not meeting the table pipe diameters and lengths



54-68 NATIONAL FUEL GAS CODE Z223.1-68

gas supply shall be shut off until the necessary repairs have been made.

8.2.4 Placing Appliances and Equipment in Operation. Appliances and equipment shall not be placed in operation until after the piping system has been checked for leakage in accordance with 8.2.3, the piping system is purged in accordance with 8.3 and, connections to the appliance are checked for leakage.

8.3* Purging Requirements.

The purging of piping shall be in accordance with 8.3.1 through 8.3.3

8.3.1* Piping systems required to be purged outdoors. The purging of piping systems shall be in accordance with 8.3.1.1 through 8.3.1.4 where the piping system meets either of the following:

1. The design operating gas pressure is greater than 2 psig (14 kPa).
2. The piping being purged contains one or more sections of pipe or tubing not meeting the size and length criteria of Table 8.3.1.

8.3.1.1 Removal from Service. Where existing gas piping is opened, the section that is opened shall be isolated from the gas supply and the line pressure vented in accordance with 8.3.1.3. Where gas piping meeting the criteria of Table 8.3.1 is removed from service, the residual fuel gas in the piping shall be displaced with an inert gas.

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1. The point of discharge shall be controlled with a shutoff valve.
2. The point of discharge shall be located at least 10 ft (3.0 m) from sources of ignition, at least 10 ft (3.0 m) from building openings and at least 25 ft (7.6 m) from mechanical air intake openings.
3. During discharge, the open point of discharge shall be continuously attended and monitored with a combustible gas indicator that complies with Section 8.3.1.4.
4. Purging operations introducing fuel gas shall be stopped when 90 percent fuel gas by volume is detected within the pipe.
5. Persons not involved in the purging operations shall be evacuated from all areas within 10 ft (3.0 m) of the point of discharge.

8.3.1.4* Combustible Gas Indicator. Combustible gas indicators shall be listed and shall be calibrated in accordance with the manufacturer's instructions. Combustible gas indicators shall numerically display a volume scale from 0 percent to 100 percent in 1 percent or smaller increments.

8.3.2* Piping systems allowed to be purged indoors or outdoors. The purging of piping systems shall be in accordance with the provisions of 8.3.2.1 where the piping system meets both of the following:

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3. The piping shall be purged with fuel gas and shall discharge to the indoors or outdoors through a burner that has a continuous source of ignition and that is designed for such purpose.
4. The piping shall be purged with fuel gas that is dis-

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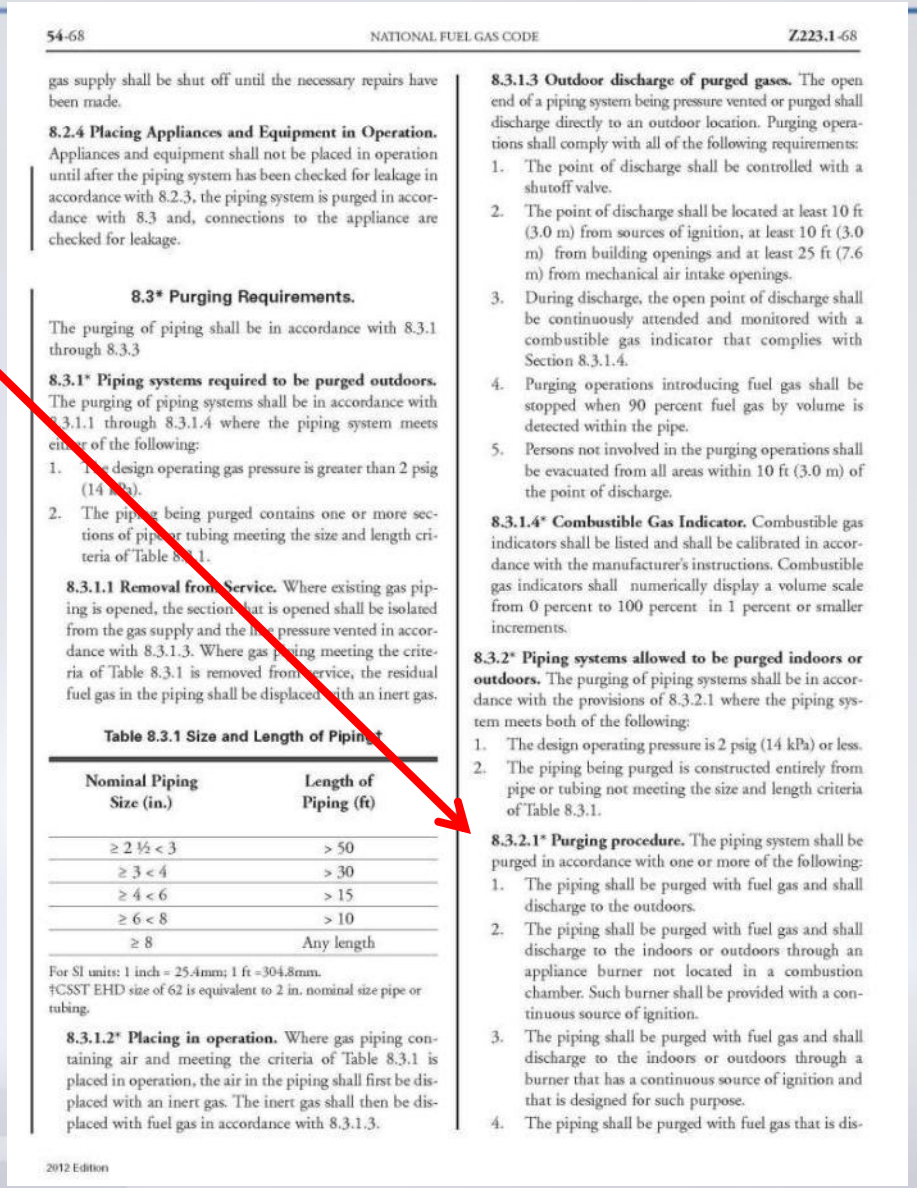
Purging

Five Methods Provided

- Outdoors with no other requirements
- Indoor or Outdoors where monitored by a CGD
- Indoors or Outdoors through appliance burner
- Indoors or Outdoors through a stand alone burner
- Gas supplier written procedures



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gas supply shall be shut off until the necessary repairs have been made.

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8.3* Purging Requirements.

The purging of piping shall be in accordance with 8.3.1 through 8.3.3

8.3.1* Piping systems required to be purged outdoors. The purging of piping systems shall be in accordance with 8.3.1.1 through 8.3.1.4 where the piping system meets either of the following:

1. The design operating gas pressure is greater than 2 psig (14 kPa).
2. The piping being purged contains one or more sections of pipe or tubing meeting the size and length criteria of Table 8.3.1.

8.3.1.1 Removal from Service. Where existing gas piping is opened, the section that is opened shall be isolated from the gas supply and the line pressure vented in accordance with 8.3.1.3. Where gas piping meeting the criteria of Table 8.3.1 is removed from service, the residual fuel gas in the piping shall be displaced with an inert gas.

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8.3.1.3 Outdoor discharge of purged gases. The open end of a piping system being pressure vented or purged shall discharge directly to an outdoor location. Purging operations shall comply with all of the following requirements:

1. The point of discharge shall be controlled with a shutoff valve.
2. The point of discharge shall be located at least 10 ft (3.0 m) from sources of ignition, at least 10 ft (3.0 m) from building openings and at least 25 ft (7.6 m) from mechanical air intake openings.
3. During discharge, the open point of discharge shall be continuously attended and monitored with a combustible gas indicator that complies with Section 8.3.1.4.
4. Purging operations introducing fuel gas shall be stopped when 90 percent fuel gas by volume is detected within the pipe.
5. Persons not involved in the purging operations shall be evacuated from all areas within 10 ft (3.0 m) of the point of discharge.

8.3.1.4* Combustible Gas Indicator. Combustible gas indicators shall be listed and shall be calibrated in accordance with the manufacturer's instructions. Combustible gas indicators shall numerically display a volume scale from 0 percent to 100 percent in 1 percent or smaller increments.

8.3.2* Piping systems allowed to be purged indoors or outdoors. The purging of piping systems shall be in accordance with the provisions of 8.3.2.1 where the piping system meets both of the following:

1. The design operating pressure is 2 psig (14 kPa) or less.
2. The piping being purged is constructed entirely from pipe or tubing not meeting the size and length criteria of Table 8.3.1.

8.3.2.1* Purging procedure. The piping system shall be purged in accordance with one or more of the following:

1. The piping shall be purged with fuel gas and shall discharge to the outdoors.
2. The piping shall be purged with fuel gas and shall discharge to the indoors or outdoors through an appliance burner not located in a combustion chamber. Such burner shall be provided with a continuous source of ignition.
3. The piping shall be purged with fuel gas and shall discharge to the indoors or outdoors through a burner that has a continuous source of ignition and that is designed for such purpose.
4. The piping shall be purged with fuel gas that is dis-

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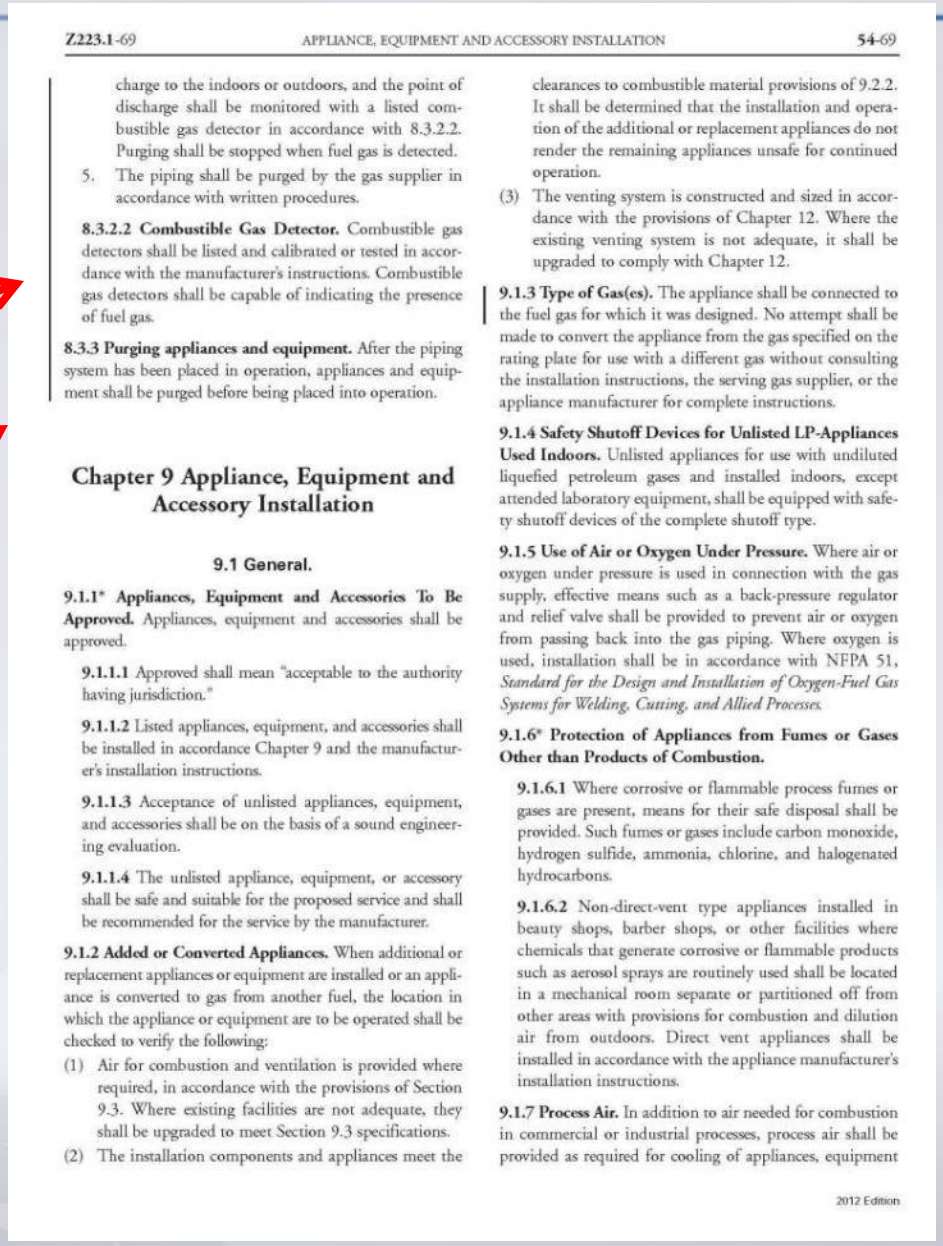
Purging

Listed & Calibrated Combustible gas detector is required

Appliances to be purged prior to operation



Z223.1-69 APPLIANCE, EQUIPMENT AND ACCESSORY INSTALLATION 54-69

charge to the indoors or outdoors, and the point of discharge shall be monitored with a listed combustible gas detector in accordance with 8.3.2.2. Purging shall be stopped when fuel gas is detected.

5. The piping shall be purged by the gas supplier in accordance with written procedures.

8.3.2.2 Combustible Gas Detector. Combustible gas detectors shall be listed and calibrated or tested in accordance with the manufacturer's instructions. Combustible gas detectors shall be capable of indicating the presence of fuel gas.

8.3.3 Purging appliances and equipment. After the piping system has been placed in operation, appliances and equipment shall be purged before being placed into operation.

Chapter 9 Appliance, Equipment and Accessory Installation

9.1 General.

9.1.1* Appliances, Equipment and Accessories To Be Approved. Appliances, equipment and accessories shall be approved.

9.1.1.1 Approved shall mean "acceptable to the authority having jurisdiction."

9.1.1.2 Listed appliances, equipment, and accessories shall be installed in accordance Chapter 9 and the manufacturer's installation instructions.

9.1.1.3 Acceptance of unlisted appliances, equipment, and accessories shall be on the basis of a sound engineering evaluation.

9.1.1.4 The unlisted appliance, equipment, or accessory shall be safe and suitable for the proposed service and shall be recommended for the service by the manufacturer.

9.1.2 Added or Converted Appliances. When additional or replacement appliances or equipment are installed or an appliance is converted to gas from another fuel, the location in which the appliance or equipment are to be operated shall be checked to verify the following:

(1) Air for combustion and ventilation is provided where required, in accordance with the provisions of Section 9.3. Where existing facilities are not adequate, they shall be upgraded to meet Section 9.3 specifications.

(2) The installation components and appliances meet the clearances to combustible material provisions of 9.2.2. It shall be determined that the installation and operation of the additional or replacement appliances do not render the remaining appliances unsafe for continued operation.

(3) The venting system is constructed and sized in accordance with the provisions of Chapter 12. Where the existing venting system is not adequate, it shall be upgraded to comply with Chapter 12.

9.1.3 Type of Gas(es). The appliance shall be connected to the fuel gas for which it was designed. No attempt shall be made to convert the appliance from the gas specified on the rating plate for use with a different gas without consulting the installation instructions, the serving gas supplier, or the appliance manufacturer for complete instructions.

9.1.4 Safety Shutoff Devices for Unlisted LP-Appliances Used Indoors. Unlisted appliances for use with undiluted liquefied petroleum gases and installed indoors, except attended laboratory equipment, shall be equipped with safety shutoff devices of the complete shutoff type.

9.1.5 Use of Air or Oxygen Under Pressure. Where air or oxygen under pressure is used in connection with the gas supply, effective means such as a back-pressure regulator and relief valve shall be provided to prevent air or oxygen from passing back into the gas piping. Where oxygen is used, installation shall be in accordance with NFPA 51, *Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes.*

9.1.6* Protection of Appliances from Fumes or Gases Other than Products of Combustion.

9.1.6.1 Where corrosive or flammable process fumes or gases are present, means for their safe disposal shall be provided. Such fumes or gases include carbon monoxide, hydrogen sulfide, ammonia, chlorine, and halogenated hydrocarbons.

9.1.6.2 Non-direct-vent type appliances installed in beauty shops, barber shops, or other facilities where chemicals that generate corrosive or flammable products such as aerosol sprays are routinely used shall be located in a mechanical room separate or partitioned off from other areas with provisions for combustion and dilution air from outdoors. Direct vent appliances shall be installed in accordance with the appliance manufacturer's installation instructions.

9.1.7 Process Air. In addition to air needed for combustion in commercial or industrial processes, process air shall be provided as required for cooling of appliances, equipment

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Standards Development Status

NFPA 56 – CURRENTLY IN REVISION

- Public input and committee actions completed
- Draft to be posted by 6/22/12
- Public comments are due by 8/31/12
- More information at www.nfpa.org

NFPA 54 – CURRENTLY IN REVISION

- Call for public input due 6/22/12
- More information at www.aga.org or www.nfpa.org

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